

This listing of claims will replace all prior versions, and listings, of claims in the application:

1-61 (cancelled

62. (new) A method of dispensing a post-mix beverage, comprising the steps of: inserting into a beverage dispenser a container of beverage concentrate connected to a disposable pump, the disposable pump comprising a body having a surface at which opens the mouth of a cavity formed in the body, an inlet port for the concentrate opening at the surface adjacent to the mouth of the cavity whereby, when the inlet port is open, concentrate can flow from the inlet port into the cavity via the mouth thereof, an outlet port for the concentrate, a concentrate flow passageway extending through the body connecting the cavity to the outlet port, and a flexible membrane sealingly secured at its periphery to the body and overlying the cavity and the inlet and outlet ports, the portions of the flexible membrane, where the membrane overlies the inlet and outlet ports, serving as closures for the ports; providing a flow of diluent; driving the disposable pump by alternate application of vacuum and pressure to a side of the flexible membrane opposite from the cavity by means of a reusable pump actuator, so as to draw concentrate through the inlet port and into the cavity to fill the cavity and to then pump and dispense a regulated volume of beverage concentrate from the cavity and through the passageway to and through the outlet port, the concentrate only coming into contact with the disposable pump; regulating the pumped concentrate to provide a substantially constant output of concentrate during dispensing; regulating the flow of diluent in accordance with the flow of concentrate being pumped to maintain a

substantially constant ratio of diluent to concentrate; bringing the pumped concentrate flow together with the regulated diluent flow within a section of the disposable pump; passing the combined flows through a mixer to provide a substantially homogeneous mixture of diluted concentrate; and dispensing the mixture into a receptacle.

63. (new) A method according to claim 62, including the step of refrigerating the container of concentrate within the beverage dispenser.

64. (new) A method according to claim 62, wherein the disposable pump has a plurality of cavities, the volume of each of which is a fraction of the total volume of concentrate required for a beverage, and said driving step is performed such that concentrate is drawn into and pumped from each of the cavities.

65. (new) A method according to claim 64, wherein the disposable pump has two cavities.

66. (new) A method according to claim 64, including the step, upon insertion of the container of beverage concentrate and disposable pump into the beverage dispenser, of performing said driving step to fill each pump cavity.

67. (new) A method according to claim 64, wherein said driving step is performed such that the time required to fill a cavity with concentrate is less than the time to pump concentrate from a cavity and such that the pumping of concentrate from the cavities is overlapped, so that there is no break in the flow of concentrate as it is brought together with the diluent.

68. (new) A method according claim 62, wherein said driving step is performed so as to dispense selected different beverage sizes, and including the step of selecting a particular size of beverage to be dispensed.

69. (new) A method according to claim 62, wherein said driving step is performed so as to continuously dispense beverage until signaled to stop.

70. (new) A method according to claim 64, wherein said driving step is performed such that there is a time lag between termination of pumping concentrate from a cavity and filling of the cavity with concentrate, and including the step, performed if a pump cavity is not empty when pumping concentrate from the cavity terminates and dispensing beverage resumes within the time lag, of continuing to dispense from the cavity without first refilling the cavity, thereby providing a top-up function.

71. (new) A method according to claim 70, including the step, after the time lag expires, of driving the pump to fill all of the pump cavities.

72. (new) A method according to claim 62, including the steps of providing a signal comprising data indicative of the pumping properties of the concentrate, and controlling said driving step to control the flow of pumped concentrate in accordance with the signal.

73. (new) A method according to claim 72, wherein said signal providing step is performed by attaching an identifier to at least one of the concentrate container and disposable pump, the identifier carrying the data indicative of the pumping properties

of the concentrate, and including the step of automatically detecting the data stored in the identifier and generating the signal in response thereto.

74. (new) A method according to claim 72, wherein said providing step is performed manually.

75. (new) A method according to claim 64, including the steps of sensing concentrate flow continuity and, in response to a sensed flow discontinuity between dispenses from individual ones of the pump cavities, controlling the pump to eliminate the discontinuity.

76. (new) A method according to claim 75, wherein said sensing step is performed by monitoring vacuum and pressure applied to the flexible membrane to fill the pump cavities with concentrate and dispense concentrate from the pump cavities.

77. (new) A method according to claim 75, wherein said sensing step is performed through use of an optical sensor to detect concentrate flow continuity and discontinuity.

78. (new) A method according to claim 73, wherein the data indicative of the pumping properties of the concentrate includes a shelf life of the concentrate, and including the step of preventing performance of said driving step if the concentrate in the container is not within its shelf life.

79. (new) A method according to claim 72, wherein the data indicative of the pumping properties of the concentrate includes the volume of product in the container and the sizes of doses of concentrate being dispensing, and including the step of determining the number of doses of concentrate remaining in the container.

80. (new) A method according to claim 79, including the step of displaying one or both of the number of doses of concentrate remaining in the container and a warning that no more than a predetermined number of doses of concentrate remain in the container.

81. (new) A method according to claim 73, including the step of operating the beverage dispenser to write information back to the identifier.

82. (new) A method according to claims 72, wherein the beverage dispenser includes control circuitry having a memory, and including the steps of writing to the memory data indicative of the pumping properties of each concentrate inserted into the beverage dispenser, and storing in the memory such data for each container of concentrate for a selected time after the container is removed from the beverage dispenser.

83. (new) A method according to claim 82, including the step, performed upon a partially used reservoir being reinserted into the dispenser within the selected time after having been previously removed, of reading from the control circuit memory the number of doses of concentrate remaining in the container.

84. (new) A method according claim 62, including the steps of sensing the temperature of the concentrate, and controlling said driving step in accordance with the sensed temperature.

85. (new) A beverage dispenser for dispensing a post-mix beverage, said beverage dispenser comprising: a disposable pump including a body having a surface at which opens a mouth of a cavity formed in said body, an inlet port for connection

with a reservoir of beverage concentrate and opening at said surface adjacent to said mouth of said cavity whereby, when said inlet port is open, concentrate can flow from said reservoir to and through said inlet port and into said cavity via said mouth thereof, an outlet port for the concentrate, a flow passageway extending through said body connecting said cavity to said outlet port, and a flexible membrane sealingly secured at its periphery to said body surface and overlying said inlet port, said cavity and said outlet port, the portions of the flexible membrane which overlie said inlet and outlet ports serving as closures for said ports; a diluent supply system for supplying a regulated flow of diluent; a cabinet area for receiving at least one reservoir of concentrate for fluid coupling to said disposable pump inlet port; a pumping station for receiving, retaining and actuating said disposable pump to deliver concentrate from said body outlet port; means for combining the flow of diluent and pumped concentrate; and a control system for controlling operation of said pumping station to operate said disposable pump in a manner to meter the flow of pumped concentrate, so that concentrate and diluent are combined in a selected ratiometric mixture of concentrate and diluent.

86. (new) A beverage dispenser according to claim 85, wherein said pumping station includes a pump actuator having a drive face to which a side of said flexible membrane opposite from said disposable pump body cavity is coupled, said drive face being in fluid communication with sources of positive and negative pressure for moving said flexible membrane into and out of said cavity to pump concentrate from and draw concentrate into said cavity, said pump actuator having first and second



valve actuators to open and close said inlet and outlet ports of said disposable pump, and including clamping means for clamping said disposable pump to said drive face.

87. (new) A beverage dispenser according to claim 85, wherein said diluent supply comprises a water supply fluid coupled to a diluent inlet to said disposable pump body, and including diluent cooling means, flow meter means for detecting the flow of diluent, and a flow control valve to supply the regulated flow of diluent to said diluent inlet.

88. (new) A beverage dispenser according to claim 87 wherein said flow meter means is a turbine flow meter.

89. (new) A beverage dispenser according to claims 87, wherein said flow control valve is a variable orifice valve.

90. (new) A beverage dispenser according to claim 87, wherein said flow control valve is an on/off flow control valve.

91. (new) A beverage dispenser according to claim 87, including an on/off diluent valve in fluid circuit with said flow control valve.

92. (new) A beverage dispenser according to claim 86, wherein said disposable pump body has a diluent inlet and said diluent supply system delivers diluent to said clamping means and to said disposable pump body diluent inlet when said clamping means clamps said disposable pump to said drive face.

93. (new) A beverage dispenser according to claim 92, wherein diluent is delivered to said body diluent inlet through a diluent supply line and including, immediately upstream of said disposable pump, a closure for said diluent supply line.

94. (new) A beverage dispenser according to claim 86, wherein said diluent cooling means comprises a refrigerated water bath containing a refrigerant coil for chilling the water bath and a diluent coil in the water bath and through which the diluent flows.

95. (new) A beverage dispenser according to claims 85, including means for refrigerating said cabinet area for receiving the at least one reservoir of concentrate.

96. (new) A beverage dispenser according to claim 85, including means for monitoring the temperature within said cabinet area.

97. (new) A beverage dispenser according to claim 85, including a rigid enclosure for retaining a reservoir of concentrate, said reservoir of concentrate being received in said cabinet area while within said rigid enclosure.

98. (new) A beverage dispenser according to claim 97, wherein a bottom interior surface of said rigid enclosure is angled so that, when said rigid enclosure and reservoir are received in said cabinet area, concentrate in said reservoir will gravitationally flow toward a lower front region of the reservoir, said disposable pump being fluid coupled to said region.

99. (new) A beverage dispenser according to claim 98, wherein said bottom interior surface of said rigid enclosure is angled relative to horizontal in the range of about 12 to 25 degrees.

100. (new) A beverage dispenser according claim 98, wherein a lower surface of said cabinet area is at an angle corresponding to the angle of the bottom interior of said rigid enclosure.



101. (new) A beverage dispenser according to claim 97, including a temperature probe, said rigid enclosure having a hole therein and said temperature probe extending through said hole, said temperature probe protruding from said cabinet area and being in contact with said flexible reservoir within said rigid enclosure in an area of said reservoir in proximity to said disposable pump, so that said temperature probe provides a temperature reading substantially indicative of the temperature of concentrate being pumped.

102. (new) A beverage dispenser according to claim 85, said disposable pump body having a plurality of cavities therein, said pumping station including a pump actuator, having a drive face, to which to which said disposable pump body is releasably attached with a side of said flexible membrane opposite from said cavities against said drive face, said drive face having a plurality of recesses therein corresponding to and aligning with said body cavities, and including sources of negative and positive pressure, said drive face recess being fluid coupled to said sources of negative and positive pressures for alternately having negative and positive pressures applied to said recesses and thereby to said flexible membrane opposite from said pump body cavities to move said membrane out of and into said cavities to draw concentrate into said cavities through said inlet port and to pump concentrate out of said cavities through said outlet port, said pump actuator further having first and second valve actuators operable to open and close said inlet and outlet ports of said disposable pump, and including clamping means for releasably clamping said disposable pump to said pump actuator.

103. (new) A beverage dispenser according claim 86, wherein said source of positive pressure comprises a pressure pump, a pressure release valve and a pressure regulator to control the pressure being provided to said disposable pump.

104. (new) A beverage dispenser according to claim 103 wherein said pressure regulator is controlled to provide a pressure regulated in accordance with the viscosity of concentrate being pumped.

105. (new) A beverage dispenser according to claims 103, further including valve means associated with each recess on said drive face for switching the regulated pressure on and off.

106. (new) A beverage dispenser according to claim 105, wherein said valve means controls both the pressure switching and regulating functions.

107. (new) A beverage dispenser according to claims 102, including a vacuum pump for providing vacuum, and vacuum valve means for selectively coupling the vacuum provided by said vacuum pump to said recess on said drive face.

108. (new) A beverage dispenser according to claim 107, wherein the vacuum provided by said vacuum pump is coupled to said drive face recesses through a vacuum line, and including a sensor for detecting the presence of concentrate in the line.

109. (new) A beverage dispenser according to claim 108 wherein said sensor comprises an optical sensor.

110. (new) A beverage dispenser according claim 102, wherein fluid communication of said drive face with said source of pressure includes a pressure reservoir and said source of vacuum includes a vacuum reservoir.

111. (new) A beverage dispenser according to claim 110, including a selectively openable drain in the bottom of each of said pressure and vacuum reservoirs.

112. (new) A beverage dispenser according to claim 86, wherein said disposable pump inlet port has a lip therearound and said first valve actuator protrudes through said pump actuator drive face and is operable to selectively move said flexible membrane onto said inlet port lip to close said inlet port.

113. (new) A beverage dispenser according to claim 112, wherein said first valve actuator is driven by a solenoid.

114. (new) A beverage dispenser according to claim 86, wherein said disposable pump outlet port has a lip therearound and said second valve actuator protrudes through said pump actuator drive face and is operable to selectively move said flexible membrane onto said outlet port lip to close said outlet port.

115. (new) A beverage dispenser according to claim 114, including means for driving said second valve actuator in a proportional manner, such that the degree of opening of said outlet port can be controlled to vary the flow of concentrate through said outlet port.

116. (new) A beverage dispenser according to claim 115, wherein said means for driving said second valve actuator comprises a stepper motor.

117. (new) A beverage dispenser according to claim 116, wherein said stepper motor is overdriven in its closed position and then re-zeroed every time said outlet port is closed.

118. (new) A beverage dispenser according to claim 86, said pump actuator including a rolling diaphragm seal between said valve actuators and said drive face.

119. (new) A beverage dispenser according to claim 86, wherein said first and second valve actuators include relatively soft flexible membrane contacting tips.

120. (new) A beverage dispenser according to claim 102, said pump actuator including a gasket surrounding said drive face recesses for forming a seal with said disposable pump, so that application of positive and negative pressures only affect said flexible membrane whereat it overlies said disposable pump cavities.

121. (new) A beverage dispenser according to claim 86, wherein said pumping station is adapted to receive a disposable pump having two pump cavities.

122. (new) A beverage dispenser according to claims 85, wherein said beverage dispenser includes a plurality of pumping stations.